MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

BPO2614 – PRODUCTION & OPERATIONS MANAGEMENT

(All sections / Groups)

8 AUGUST 2022

9 a.m. – 12 p.m.

(3 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **SEVEN** (7) pages (including the cover page).

2. Answer **ALL** questions. The marks distributions are given in parentheses.

QUESTION 1

(a) Wellhealth is a Kaula Lumpur medical and hospital equipment manufacturer. Wellhealth is trying to decide whether to make or buy the adjustable spring component for the newly designed orthopedic mattress. Purchasing the part would cost $1.50 each. If they design and produce it themselves, it will result in a per unit cost of $0.75. However, the design investment would be $50,000. Further, they realise that for this type of part, there is a 30% chance that the part will need to be redesigned at an additional cost of $50,000. Regardless of whether they make or buy the part, Wellhealth will need 100,000 of these parts.
Using decision tree analysis and EMV, what should Wellhealth do? Show the decision tree.

[7 Marks]

(b) Using relevant examples, discuss how the product's life cycle stages affect product strategy? In particular, describe how one product in growth and another in maturity might have different product strategies.

[7 Marks]

(c) Ranga Ramasesh is the operations manager for a firm that is trying to decide which one of four countries it should research for possible outsourcing providers. The first step is to select a country based on cultural risk factors, which are critical to eventual business success with the provider. Ranga has reviewed outsourcing provider directories and found that the four countries in the table that follows have an ample number of providers from which they can choose. To aid in the country selection step, he has enlisted the aid of a cultural expert, John Wang, who has provided ratings of the various criteria in the table. The resulting ratings are on a 1 to 10 scale, where 1 is a low risk and 10 is a high risk. John has also determined six criteria weightings: Trust, with a weight of 0.4; Quality, with 0.2; Religious, with 0.1; Individualism, with 0.1; Time, with 0.1; and Uncertainty, with 0.1.
Using the factor-rating method, which country should Ranga select?

CULTURE SELECTION CRITERION	MEXICO	PANAMA	COSTA RICA	PERU
Trust	1	2	2	1
Society value of quality work	7	10	9	10
Religious attitudes	3	3	3	5
Individualism attitudes	5	2	4	8
Time orientation attitudes	4	6	7	3
Uncertainty avoidance attitudes	3	2	4	2

[6 Marks]

Continued...

QUESTION 2

(a) Roy Kamur, the operations manager at Zob Dairy, has selected and weighed five bottles of low-fat dairy milk each hour from the production line. He knows from experience that the process standard deviation is 2 litres. The weights of the bottles in the last six hours are given in the table below.

Hour	Weight (litres)				
1	2.0	2.3	2.2	2.2	2.0
2	2.4	2.1	2.4	2.1	2.3
3	2.2	2.4	2.3	2.0	2.2
4	2.5	2.5	2.2	2.0	2.5
5	2.4	2.2	2.1	2.5	2.4
6	2.3	2.1	2.2	2.4	2.1

Using the above information:

(i) Calculate upper and lower 3-sigma x-bar chart control limits.

[6 Marks]

(ii) Calculate upper and lower 3-sigma R-chart control limits.

[4 Marks]

(iii) Based on the x-bar chart and R-chart, is this process in control?

[2 Marks]

(b) A Cyberjaya based electronics appliances manufacturing company is facing stiff competition from low-priced alternatives and is looking at various solutions to remain competitive and profitable. Current financials for the firm are shown in the table below. In the first option, marketing will increase sales by 50%. The next option is vendor (supplier) changes, which would result in a decrease of 10% in the cost of inputs. Finally, there is an Operations Management option, which would reduce production costs by 25%.
Which options would you recommend to the firm if it can only pursue one option? In addition, comment on the feasibility of each option.

Business Function	Current Value
Cost of Inputs	$50,000
Production Costs	$25,000
Revenue	$80,000

[8 Marks]

Continued...

QUESTION 3

(a) The operations manager at Kidz Parks is interested in forecasting guests' attendance in week 6. He predicted six weeks ago that attendance in week one would be 160. Referring to the table below, answer the following questions.

WEEK	1	2	3	4	5	6
ATTENDANCE	180	220	260	295	310	?

(i) Develop guests' attendance forecasts for weeks 2 through 6, using exponential smoothing, with a smoothing constant of 0.6.

[5 Marks]

(ii) Develop guests' attendance forecasts for weeks 1 through 6, using the exponential smoothing with trend adjustment (initial trend is 10 and $\beta = 0.5$)

[9 Marks]

(iii) With MAD as the criterion, which of the two forecasting methods is best?

[2 Marks]

(b) Discuss TWO (2) classic supplier's negotiation strategies.

[4 Marks]

QUESTION 4

(a) Read the following case and answer the given questions.

Case Study: Parker Hi-Fi Systems

Parker Hi-Fi Systems, located in Wellesley, Massachusetts, a Boston suburb, assembles and sells the very finest home theater systems. The systems are assembled with components from the best manufacturers worldwide. Although most of the components are procured from wholesalers on the east Coast, some critical items, such as LCD screens, come directly from their manufacturer. For instance, the LCD screens are shipped via air from Foxy, Ltd., in Taiwan, to Boston's Logan airport, and the top-of-the-line speakers are purchased from the world-renowned U.S. manufacturer Boss.

Parker's purchasing agent, Raktim Pal, submits an order release for LCD screens once every 4 weeks. The company's annual requirements total 500 units (2 per working day), and Parker's per unit cost is $1,500. (Because of Parker's relatively low volume and the quality focus—rather than volume focus—of many of Parker's supplies, Parker is seldom able to obtain quantity discounts.) Since Foxy promises delivery within 1 week following receipt of an order release, Parker has never had a shortage of LCDs. (Total time between date of the release and date of receipt is 1 week or 5 working days.)

Continued...

Parker's activity-based costing system has generated the following inventory-related costs. Procurement costs, which amount to $500 per order, include the actual labor costs involved in ordering, custom inspection, arranging for airport pickup, delivery to the plant, maintaining inventory records, and arranging for the bank to issue a check. Parker's holding costs take into account storage, damage, insurance, taxes, and so forth on a square-foot basis. These costs equal $150 per LCD per year.

With added emphasis being placed on efficiencies in the supply chain, Parker's president has asked Raktim to seriously evaluate the purchase of the LCDs. One area to be closely scrutinised for possible cost savings is inventory procurement.

Required:

(i) Determine the Economic Order Quantity and associated costs.

[6 Marks]

(ii) What is the optimal reorder point (ROP) for LCDs?

[2 Marks]

(iii) What cost savings will Parker realise if it implements an order plan based on EOQ?

[3 Marks]

(b) Explain what is meant by the expression "robust model." Specifically, what would you tell a manager who exclaimed, "Uh-oh, we are in trouble! The calculated EOQ is wrong; actual demand is 10% greater than estimated.

[4 Marks]

(c) How are inventory levels monitored in retail stores?

[5 Marks]

QUESTION 5

(a) Alza Manufacturing Sdn. Bhd., is moving to kanbans to support its automobile assembly lines. Using the information below, determine the size of the kanban for subassemblies and the number of kanbans needed.
Setup cost = RM30
Annual holding cost = RM120 per subassembly
Daily production = 20 subassemblies
Annual usage = 2,500 (50 weeks * 5 days each * daily usage of 10 subassemblies)
Lead time = 16 days
Safety stock = 4 days' production of subassemblies.

[7 Marks]

(b) Does lean production work in the service sector? Provide an illustration.

[5 Marks]

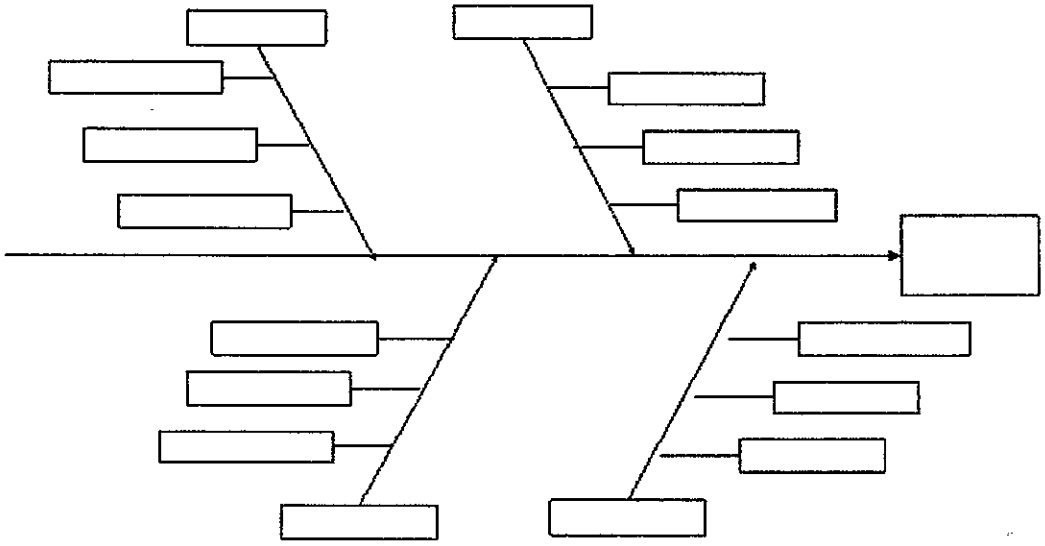
Continued...

(c) A refrigeration and heating company that installs and repairs home central air and heating systems has asked your advice on how to analyze their service quality. They have logged customer complaints. Here's a recent sampling. 1. "I was overcharged — your labor rates are too high." 2. "The repairman left trash where he was working." 3. "You weren't here when you said you would be. You should call when you must be late." 4. "Your repairman smoked in my house." 5. "The part you installed is not as good as the factory original." 6. "Your repairman was here for over two hours, but he wasn't taking his work seriously." 7. "You didn't tighten some of the fittings properly — the system's leaking." 8. "Your estimate of repair costs was WAY off." 9. "I called you to do an annual inspection, but you've done more — work that I didn't authorize." 10. "Your mechanic is just changing parts — he doesn't have a clue what's really wrong." 11. "Your bill has only a total — I wanted to see detailed billing." 12. "Your testing equipment isn't very new — are you sure you've diagnosed the problem?" 13. "One of the workers tracked mud into my living room."

Required:

Use the template below to construct a conventional cause-and-effect diagram. Place each of the complaints onto a main cause; justify your choice with a brief comment as necessary.

[8 Marks]



Formulas

$$F_t = \alpha(A_{t-1}) + (1 - \alpha)(F_{t-1} + T_{t-1})$$

$$F_t = \alpha(A_{t-1}) + (1 - \alpha)(F_{t-1} + T_{t-1})$$

$$T_t = \beta(F_t - F_{t-1}) + (1 - \beta)T_{t-1}$$

$$FIT_t = F_t + T_t$$

$$Q^* = \sqrt{\frac{2DS}{H}}$$

$$ROP = L(d)$$

$$Ordering\ costs = \frac{DS}{Q} \qquad Holding\ cost = \frac{QH}{2}$$

$$Q_p = \sqrt{\frac{2DS}{H\left(1 - \frac{d}{p}\right)}}$$

SS = ½ X Daily demand

Number of Kanbans = (Demand during lead time + Safety stock) / Container size

$$UCL_{\bar{x}} = \bar{\bar{X}} + z\sigma_x \ ; \ LCL_{\bar{x}} = \bar{\bar{X}} - z\sigma_x$$

$$UCL_R = D_4\bar{R} \ ; \quad D_4 = 2.115; \ LCL_R = D_3\bar{R}; \quad D_3 = 0$$

$$S\ (for\ Lot\ size) = \frac{Q^2 * H * \left(1 - \frac{d}{p}\right)}{2D}$$

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